

Straus Theory Exercises
Ch. 3: VI (pp. 116)

ANSWERS

VI. 1.

a. **[0,1,6,7]**

The cardinality (c) of pc set [0,1,6,7] is 4. There are $2^c=16$ subsets of any pc set whose cardinality is 4.

Subsets of [0,1,6,7]

4-note subsets of [0,1,6,7]

PC Set	Normal Form	Set Class
(0,1,6,7)	[0,1,6,7]	4-9 (0167)

3-note subsets of [0,1,6,7]

PC Set	Normal Form	Set Class
(0,1,6)	[0,1,6]	3-5 (016)
(0,6,7)	[6,7,0]	3-5 (016)
(1,6,7)	[1,6,7]	3-5 (016)
(0,1,7)	[7,0,1]	3-5 (016)

2-note subsets of [0,1,6,7]

PC Set	Normal Form	Set Class
(0,1)	[0,1]	2-1 (01)
(0,6)	[0,6]	2-6 (06)
(0,7)	[7,0]	2-5 (05)
(1,6)	[1,6]	2-5 (05)
(1,7)	[1,7]	2-6 (06)
(6,7)	[6,7]	2-1 (01)

1-note subsets of [0,1,6,7]

PC Set	Normal Form	Set Class
(0)	[0]	1-1 (0)
(1)	[1]	1-1 (0)
(6)	[6]	1-1 (0)
(7)	[7]	1-1 (0)

0-note subsets of [0,1,6,7]

Φ

b. [0,1,4,8]

The cardinality (c) of pc set [0,1,4,8] is 4. There are $2^c=16$ subsets of any pc set whose cardinality is 4.

Subsets of [0,1,4,8]

4-note subsets of [0,1,4,8]

PC Set	Normal Form	Set Class
(0,1,4,8)	[0,1,4,8]	4-19 (0148)

3-note subsets of [0,1,4,8]

PC Set	Normal Form	Set Class
(0,1,4)	[0,1,4]	3-3 (014)
(0,4,8)	[0,4,8]	3-12 (048)
(1,4,8)	[1,4,8]	3-11 (037)
(0,1,8)	[8,0,1]	3-4 (015)

2-note subsets of [0,1,4,8]

PC Set	Normal Form	Set Class
(0,1)	[0,1]	2-1 (01)
(0,4)	[0,4]	2-4 (04)
(0,8)	[8,0]	2-4 (04)
(1,4)	[1,4]	2-3 (03)
(1,8)	[8,1]	2-5 (05)
(4,8)	[4,8]	2-4 (04)

1-note subsets of [0,1,4,8]

PC Set	Normal Form	Set Class
(0)	[0]	1-1 (0)
(1)	[1]	1-1 (0)
(4)	[4]	1-1 (0)
(8)	[8]	1-1 (0)

0-note subsets of [0,1,4,8]

Φ

c. [0,1,3,6,9]

The cardinality (c) of pc set [0,1,3,6,9] is 5. There are $2^c=32$ subsets of any pc set whose cardinality is 5.

Non-trivial Subsets of [0,1,3,6,9]

Output from Michael Buchler's *Setmaker*

2-note subsets of [01369]				
1	[01]	2-1	max-3	min+1
1	[02]	2-2	max-3	min+1
4	[03]	2-3	max-0	min+4
1	[04]	2-4	max-3	min+0
1	[05]	2-5	max-3	min+1
2	[06]	2-6	max-0	min+2
3-note subsets of [01369]				
1	[013]	3-2	max-3	min+1
1	[014]	3-3	max-2	min+1
1	[025]	3-7	max-3	min+1
1	[016]	3-5	max-4	min+1
1	[026]	3-8	max-5	min+1
4	[036]	3-10	max-0	min+4
1	[037]	3-11	max-2	min+1
4-note subsets of [01369]				
1	[0136]	4-13	max-1	min+1
1	[0236]	4-12	max-1	min+1
1	[0147]	4-18	max-1	min+1
1	[0258]	4-27	max-1	min+1
1	[0369]	4-28	max-0	min+1
5-note subsets of [01369]				
1	[01369]	5-31	max-0	min+1

d. [0,1,4,5,8,9]

The cardinality (c) of pc set [0,1,3,6,9] is 5. There are $2^c=64$ subsets of any pc set whose cardinality is 6.

Non-trivial Subsets of [0,1,4,5,8,9]

Output from Michael Buchler's *Setmaker*

2-note subsets of [014589]				
3	[01]	2-1	max-2	min+3
3	[03]	2-3	max-2	min+3
6	[04]	2-4	max-0	min+4
3	[05]	2-5	max-2	min+3
3-note subsets of [014589]				
6	[014]	3-3	max-0	min+6
6	[015]	3-4	max-0	min+6
6	[037]	3-11	max-0	min+6
2	[048]	3-12	max-0	min+2
4-note subsets of [014589]				
3	[0145]	4-7	max-0	min+3
3	[0347]	4-17	max-0	min+3
6	[0148]	4-19	max-0	min+6
3	[0158]	4-20	max-0	min+3
5-note subsets of [014589]				
6	[01458]	5-21	max-0	min+6
6-note subsets of [014589]				
1	[014589]	6-20	max-0	min+1

VI. 2.

- a. Of the 256 subsets of 8-23 (0123578T), how many occurrences of the tetrachordal set class 4-23 (0257) are there? 5

Output from Michael Buchler's *Setmaker*

2-note subsets of [0123578a]				5-note subsets of [0123578a]			
4 [01]	2-1	max-3	min+0	2 [01235]	5-2	max-4	min+2
6 [02]	2-2	max-1	min+2	2 [01246]	5-9	max-2	min+2
5 [03]	2-3	max-3	min+1	2 [01356]	5-z12	max-0	min+2
4 [04]	2-4	max-3	min+0	2 [01237]	5-5	max-2	min+2
7 [05]	2-5	max-0	min+3	2 [01247]	5-z36	max-2	min+2
2 [06]	2-6	max-2	min+0	2 [02347]	5-11	max-2	min+2
3-note subsets of [0123578a]				2 [01257]	5-14	max-2	min+2
2 [012]	3-1	max-4	min+2	4 [01357]	5-24	max-0	min+4
6 [013]	3-2	max-4	min+2	6 [02357]	5-23	max-0	min+6
2 [014]	3-3	max-7	min+0	2 [01267]	5-7	max-6	min+2
4 [024]	3-6	max-2	min+4	2 [01367]	5-19	max-6	min+2
6 [015]	3-4	max-3	min+6	2 [01258]	5-z38	max-2	min+2
10 [025]	3-7	max-0	min+6	6 [01358]	5-27	max-0	min+6
6 [016]	3-5	max-6	min+2	4 [02358]	5-25	max-4	min+4
4 [026]	3-8	max-8	min+0	4 [01368]	5-29	max-0	min+4
2 [036]	3-10	max-6	min+0	4 [01568]	5-20	max-0	min+4
6 [027]	3-9	max-0	min+6	2 [01469]	5-32	max-6	min+2
8 [037]	3-11	max-1	min+6	2 [02469]	5-34	max-0	min+2
4-note subsets of [0123578a]				4 [02479]	5-35	max-0	min+4
1 [0123]	4-1	max-4	min+1	6-note subsets of [0123578a]			
2 [0124]	4-2	max-6	min+2	2 [012357]	6-9	max-0	min+2
2 [0125]	4-4	max-4	min+2	1 [023457]	6-8	max-1	min+1
6 [0135]	4-11	max-0	min+6	2 [012467]	6-z12	max-2	min+2
3 [0235]	4-10	max-1	min+3	2 [012358]	6-z40	max-0	min+2
2 [0126]	4-5	max-6	min+2	4 [013568]	6-z25	max-0	min+4
4 [0136]	4-13	max-4	min+4	1 [012378]	6-z38	max-1	min+1
2 [0146]	4-z15	max-6	min+0	2 [012578]	6-18	max-2	min+2
2 [0246]	4-21	max-4	min+2	2 [013578]	6-z26	max-0	min+2
2 [0156]	4-8	max-2	min+2	2 [012469]	6-z46	max-0	min+2
2 [0127]	4-6	max-2	min+2	2 [012479]	6-z47	max-0	min+2
4 [0137]	4-z29	max-4	min+2	4 [023579]	6-33	max-0	min+4
6 [0237]	4-14	max-0	min+6	3 [024579]	6-32	max-0	min+3
2 [0147]	4-18	max-6	min+2	1 [014679]	6-z50	max-3	min+1
8 [0247]	4-22	max-0	min+8	7-note subsets of [0123578a]			
1 [0347]	4-17	max-3	min+1	2 [0123578]	7-14	max-0	min+2
4 [0157]	4-16	max-4	min+4	2 [0234579]	7-23	max-0	min+2
5 [0257]	4-23	max-0	min+5	2 [0124679]	7-29	max-0	min+2
1 [0167]	4-9	max-2	min+1	2 [013568a]	7-35	max-0	min+2
3 [0158]	4-20	max-1	min+3	8-note subsets of [0123578a]			
4 [0258]	4-27	max-4	min+4	1 [0123578a]	8-23	max-0	min+1
4 [0358]	4-26	max-0	min+4				

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- b. Consider the 128 subsets of the major scale 7-35 (013568T). Of the 3-note subsets, which trichordal set class has the most occurrences? **3-7 (025) with 8 occurrences**. Of the 4-note subsets, which tetrachordal set class has the most occurrences? **4-22 (0247) with 6 occurrences**.

Output from Michael Buchler's *Setmaker*

2-note subsets of [013568a]	5-note subsets of [013568a]
2 [01] 2-1 max-4 min+0	1 [01356] 5-z12 max-0 min+1
5 [02] 2-2 max-1 min+3	2 [01357] 5-24 max-0 min+2
4 [03] 2-3 max-2 min+2	4 [02357] 5-23 max-0 min+4
3 [04] 2-4 max-3 min+0	4 [01358] 5-27 max-0 min+4
6 [05] 2-5 max-0 min+4	2 [02358] 5-25 max-1 min+2
1 [06] 2-6 max-2 min+0	2 [01368] 5-29 max-0 min+2
3-note subsets of [013568a]	2 [01568] 5-20 max-1 min+2
4 [013] 3-2 max-4 min+3	1 [02469] 5-34 max-1 min+1
3 [024] 3-6 max-3 min+3	3 [02479] 5-35 max-0 min+3
4 [015] 3-4 max-3 min+4	6-note subsets of [013568a]
8 [025] 3-7 max-0 min+7	2 [013568] 6-z25 max-0 min+2
2 [016] 3-5 max-7 min+0	1 [013578] 6-z26 max-0 min+1
2 [026] 3-8 max-10 min+0	2 [023579] 6-33 max-0 min+2
1 [036] 3-10 max-4 min+0	2 [024579] 6-32 max-0 min+2
5 [027] 3-9 max-0 min+5	7-note subsets of [013568a]
6 [037] 3-11 max-1 min+6	1 [013568a] 7-35 max-0 min+1
4-note subsets of [013568a]	
4 [0135] 4-11 max-0 min+4	
2 [0235] 4-10 max-0 min+2	
2 [0136] 4-13 max-2 min+2	
1 [0246] 4-21 max-5 min+1	
1 [0156] 4-8 max-2 min+1	
2 [0137] 4-z29 max-2 min+2	
4 [0237] 4-14 max-0 min+4	
6 [0247] 4-22 max-0 min+6	
2 [0157] 4-16 max-3 min+2	
4 [0257] 4-23 max-0 min+4	
2 [0158] 4-20 max-1 min+2	
2 [0258] 4-27 max-2 min+2	
3 [0358] 4-26 max-0 min+3	

- c. Consider the 64 subsets of the whole tone scale 6-35 (02468T). Of the 3-note subsets, how many different set classes are represented? **3: 3-6 (024), 3-8 (026) and 3-12 (048)**.

Output from Michael Buchler's *Setmaker*

2-note subsets of [02468a]	5-note subsets of [02468a]
6 [02] 2-2 max-0 min+6	6 [02468] 5-33 max-0 min+6
6 [04] 2-4 max-0 min+4	6-note subsets of [02468a]
3 [06] 2-6 max-0 min+3	1 [02468a] 6-35 max-0 min+1
3-note subsets of [02468a]	
6 [024] 3-6 max-0 min+6	
12 [026] 3-8 max-0 min+12	
2 [048] 3-12 max-0 min+2	
4-note subsets of [02468a]	
6 [0246] 4-21 max-0 min+6	
6 [0248] 4-24 max-0 min+6	
3 [0268] 4-25 max-0 min+3	